

**ARIZONA DEPARTMENT OF TRANSPORTATION
OFFICE MEMO**

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TO: William Higgins
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FROM: Julio Alvarado
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RE: 2002 Status Report of the Design-Build Process
In Accordance with A.R.S. 28-7363

Senate Bill 1253 (1996) established A.R.S. 28-7362 to authorize design-build contracting and went into effect July 1996. House Bill 2651 (1998) modified the process and went into effect August 1998. In 2000 House Bill 2340 established, in statute, design-build as a permanent program to be used by procurement agents of the Arizona Department of Transportation (ADOT), counties, cities, and other parties. Minor modifications to the design-build program were made in 2001 through House Bill 2425.

I am pleased to report the progress on implementing the design-build process within the Arizona Department of Transportation for 2002. This report fulfills the requirements of A.R.S. 28-7363.

EXECUTIVE SUMMARY

The principal benefit received from using the design-build method of construction is speed of construction and early completion of projects. In April of 2002, the widening of 13.5 miles of State Route 68, between Bullhead City and Kingman, to a four-lane divided highway from an existing two-lane highway, was completed in 400 days. This is approximately 1 month earlier than estimated by ADOT resulting in a cost savings of lost time to delayed motorists of over \$160,000. When compared to the conventional design-bid-build method, completion was approximately 3 years sooner. Other benefits include lower costs for design and construction and lower construction engineering expenses. Based upon ADOT averages the cost for design and construction was 8 percent lower than the conventional design-bid-build projects, representing a savings of over \$3 million. The construction engineering costs were 2% lower, amounting to a savings of over \$800,000.

Construction is basically complete on the widening of U.S. 60 (Superstition Freeway) between Interstate 10 and Val Vista Road. Although there is some minor work still remaining, the roadway is complete and all lanes were opened to traffic in October. This was 18 months quicker than ADOT estimates. This has alleviated one of the

most congested freeway sections on the highway system resulting in a cost savings of lost time to delayed motorists of over \$25 million. When compared to the conventional design-bid-build method, opening US 60 to its new configuration occurred more than 3 years sooner than anticipated. The cost for design and construction is estimated to be 2.5% lower than the conventional design-bid-build method, amounting to a savings of over \$4 million. Construction engineering costs are estimated at ½ % lower, or a savings of over \$700,000.

In Phoenix, bid proposals have been received on widening approximately 9.5 miles of State Route 51 between Interstate 10 and Shea Boulevard. It is anticipated that the project will be awarded to the successful proposer in January of 2003. Savings similar to those on the SR 68 and US 60 projects can be anticipated.

Details of these projects are included in a following section of this report.

BENEFITS AND SAVINGS

Costs of procurement are estimated to be less than conventional methods. There is a major difference in the procurement methods. Under conventional design-bid-build methods a design concept report is prepared, complete plans and specifications are developed, a contract bid package is prepared and the project is constructed. Under design-build, the plans preparation is not an ADOT activity; the design-build contractor develops plans simultaneously with construction activities. With all parties providing immediate input into plans preparation, repetition and duplication are avoided. Engineering firms involved in this activity have informed us that plans are prepared more economically than when conventional systems are used.

Administrative costs on this type of design-build construction are reduced. In addition to the speed of construction, which reduces time of inspection, smaller engineering crews are needed by ADOT, as quality requirements and documentation are contractor responsibilities. The payment method is established as lump sum with monthly payments being developed from the contractor's critical path work item schedule. The project managers of both ADOT and the contractor agree upon work completed each month, and payment is made. A very detailed and lengthy conventional monthly payment estimate normally used is eliminated from the process, reducing numerous office personnel time. On the SR 68 and US 60 projects the construction engineering expenses were 3.9% and 5.5% respectively. The average construction engineering cost for the conventional design-build-bid project is 5.9%.

This process is only successful with constant close teamwork, consensus development and issue resolution. As a result the need for supplemental agreements have been greatly reduced. On the SR 68 and US 60 projects 23 and 37 supplemental agreements were executed respectively. On projects of this

magnitude 70 or more change orders apiece would not be uncommon. At an administrative processing cost of \$1500 per change order, this calculates to a savings of over \$100,000.

There is definitely more risk assigned to the contractor, however extreme care is taken by ADOT to fully define the scope of work required, attempting to keep risk at a minimum. Engineering staffs assigned to these projects are carefully selected to provide the best experience possible. It is known that costs incurred are within normal expected construction practices. Project personnel, through ADOT's Partnering Program, resolve all issues and there are no expenses involved in settling claims. The SR 68 and US 60 projects were completed 2.49% and 8.03% over the bid amount. Conventional projects finish approximately 10.5% above the bid amount.

The most recent survey of motorists revealed that speed of construction in transportation projects is their number one desired improvement. The design-build method of construction provides this improvement. In Mohave County, ADOT estimated that the widening of State Route 68 would take 440 days; the contractor completed it in 415 days. These 25 fewer days of motorist delay resulted in a road user cost savings of over \$160,000. In Tempe and Mesa, ADOT estimated that the US 60 widening would be opened to traffic in 1100 days; the contractor had it opened to traffic in just 560 days. The 540 fewer days of motorist delay resulted in a road user cost savings of over \$25 million. Also commercial activities in the vicinity were inconvenienced the minimum time, as reconstruction of the interchanges was accelerated.

PROJECT DETAILS

- Mohave County Project SR 68, Davis Dam - Kingman Hwy., MP 1 to MP 14
Completed April 2002

The project converted the remaining 13.5 miles of two-way roadway to a four-lane divided highway from Bullhead City to Kingman. This project was completed three years earlier than originally planned. This project was selected for its rural environment and mountainous terrain as another application of the design-build process. Three firms were short-listed and the project was awarded to the Kiewit Western Company for an amount of \$42,118,780.00. Incentives were built into this contract to discourage motorist delay while traveling through construction in mountainous terrain.

- Tempe-Mesa Project: US 60 Superstition Freeway Widening Project.
Underway; all new lanes opened Oct. 2002;
Anticipated completion January 2003

This project added additional lanes, including HOV and Auxiliary Lanes to the Superstition Freeway between Interstate 10 and Val Vista Road. It also includes a major interchange modification, adding a bridge to connect the HOV lanes from I-10 to US 60. Six firms submitted proposals and 4 firms were short-listed and submitted price proposals. The estimated cost of this project was \$255 million, the largest in ADOT history. The successful proposer, Granite²Sundt a Joint Venture, submitted a price of \$184,292,800.00 (\$70 million under the state estimate). All lanes were opened to traffic in October 2002. Construction should be complete by the end of January 2003.

The concept of "a +b" (cost + time) bidding was used in selecting the low bidder. Each bidder figured the shortest time in which he can build the job, multiplied that number of days times a daily value of \$50,000 per day and added that to his cost to determine his job cost for selection purposes. This value was divided by the technical proposal score to determine the Best Value lowest bidder.

Eight incentives were built into this contract to alleviate customer (motorist) inconvenience:

- Placing Auxiliary Lanes into operation
- Placing new lighting into operation
- Operating a superior public relations program
- Providing superior construction quality management performance
- Smoothness of asphalt surface
- Additional thickness of Portland cement concrete pavement
- Additional strength of Portland cement concrete pavement
- Maintaining a safe work site

- Phoenix Project: SR 51 HOV Lanes.
 - Bid Process underway;
 - Anticipated award in January 2003

This project will add an HOV lane to NB and SB State Route 51 from I-10 to Shea Boulevard. The bid process is underway and the proposals have been short-listed to three proposers. It is anticipated the project will be awarded in January 2003. The estimated cost of this project is \$100 million with an estimated completion time of approximately 16 months. Similar to the US 60 project, "a+b" bidding will be used to assist in selecting the low bidder.

The benefits to using the design-build process include speed of construction, design, savings in construction costs and contract administration, and tremendous reductions in motorist delay. It is the intent of the Arizona Department of Transportation to continue using this process to be of benefit to the citizens of Arizona.